IN THE CLAIMS

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45. (New) A method for vascular analysis of a subject, comprising the steps of optically imaging at least one optically accessible blood vessel of a subject; determining from said optical imaging at least one flow characteristic of erythrocytes in said at least one optically accessible blood vessel; and utilizing said at least one flow characteristic for determining the roughness on said inner wall of said at least one optically accessible blood vessel.

46. (New) A method according to claim 45, wherein said at least one optically accessible blood vessel is a retinal blood vessel.

47. (New) A method according to claim 45, and wherein said at least one optically accessible blood vessel of the subject is located in tissue of an internal organ.

48. (New) A method according to claim 47, and wherein said tissue is selected from the group consisting of esophageal tissue, gastro-intestinal tissue, brain tissue and the internal surface of a passageway.

49. (New) A method according to claim 45, wherein said detecting the presence of roughness on the inner wall of a blood vessel of a subject is performed non-invasively.

50. (New) A method according to claim 45, wherein said optical imaging comprises acquiring at least two sequential images of erythrocytes in said at least one optically accessible blood vessel.

51. (New) A method according to claim 45, and also comprising the step of utilizing said

determination of said roughness on said inner wall of said at least one optically accessible blood vessel in order to ascertain the condition of another blood vessel of the subject.

52. (New) A method according to claim 45, and wherein said roughness on said inner wall of said at least one optically accessible blood vessel is utilized to ascertain the level of arteriosclerosis in the subject.

53. (New) A method according to claim 45, and wherein said at least one flow characteristic of said erythrocytes comprises at least one of the mean curvature of the motion lines of said erythrocytes, the deviation from cylindrical symmetry of the motion lines of said erythrocytes, the spatial density of local turbulences in the motion lines of said erythrocytes, and the local deviations from the global character of the motion lines of said erythrocytes.

54. (New) A method for vascular analysis of a subject, comprising the steps of:

(i) optically imaging at least one optically accessible blood vessel of a subject having a first blood pressure, said blood pressure being subject to change;

(ii) optically imaging said at least one optically accessible blood vessel again when said blood pressure of said subject has changed to a second value;

(iii) determining from said optical imaging of steps (i) and (ii) at least one flow characteristic of erythrocytes in said at least one optically accessible blood vessel, at said first and said second blood pressure; and

(iv) utilizing differences obtained in said at least one flow characteristic at said first and said second blood pressure to determine a roughness index of said inner wall of said at least one optically accessible blood vessel.

55. (New) A method according to claim 54, and wherein said change of said first blood pressure to said second blood pressure is caused by at least one of exercise and drugs

administered to the subject.

56. (New) A method according to claim 54, and wherein said change of said first blood pressure to said second blood pressure is a result of the subject's heartbeat.

57. (New) A method according to claim 56, and also comprising the step of synchronizing said optically imaging steps to the subject's heartbeat.

58. (New) A method according to claim 57, and wherein said synchronizing is performed by monitoring at least one of the subject's heartbeat cycle and blood pressure, and using said monitoring to control the timing of said optical imaging.

59. (New) A method for detecting arteriosclerotic plaque on the walls of blood vessels of a subject, comprising the steps of:

providing a biochemical label for said plaque having predetermined optical properties;

labeling of at least part of said arteriosclerotic plaque with said biochemical label; and

optically imaging at least one optically accessible blood vessel to detect said labeled arteriosclerotic plaque.

60. (New) A method according to claim 59, wherein said at least one optically accessible blood vessel of the subject is at least one of a retinal blood vessel, an esophageal blood vessel, and an intestinal blood vessel.

61. (New) A method according to claim 59 and wherein said predetermined optical properties of said biochemical label are at least one of fluorescent, absorptive and reflective properties, and where said optical imaging is accordingly at least one of fluorescence,

absorption and reflection imaging.

62. (New) The method according to claim 59 and wherein said biochemical label is an antibody label.

63. (New) A method for detecting arteriosclerotic plaque on the walls of blood vessels of a subject, comprising the steps of:

providing a radioactive biochemical label for said arteriosclerotic plaque;

labeling of at least part of said arteriosclerotic plaque with said radioactive biochemical label; and

radiographically imaging at least one of said blood vessels of the subject to detect said radioactively-labeled arteriosclerotic plaque.

64. (New) A method according to claim 63, and wherein said at least one of said blood vessels of the subject is not optically accessible.

65. (New) A method according to claim 63, and wherein said biochemical label is an antibody label.

66. (New) A system for vascular analysis of a subject, comprising:

(i) a light source for illuminating at least one optically accessible blood vessel of the subject;

(ii) an imager for acquiring a plurality of images showing sequential spatial distribution of moving erythrocytes in said at least one optically accessible blood vessel;

(iii) an image discriminator determining from said plurality of images showing sequential spatial distribution, a flow pattern of erythrocytes along said blood vessel;

(iv) a flow analyzer analyzing said flow pattern to determine at least one flow characteristic of erythrocytes along said at least one optically accessible blood vessel of the subject; and

(v) a wall analyzer utilizing said at least one flow characteristic for determining at least one property of the inner surface of said blood vessel.

67. (New) A system according to claim 66, and wherein said at least one property of the inner surface of said blood vessel is the roughness of the inner surface of said blood vessel.

68. (New) A system according to claim 66, and also comprising an arteriosclerotic index determiner utilizing said roughness to determine the level of arterosclerosis in said at least one optically accessible blood vessel.

69. (New) A system according to claim 68 and wherein said arteriosclerotic index determiner utilizes said roughness to ascertain the arteriosclerotic condition of another blood vessel of the subject.

70. (New) A system according to claim 66, and wherein said at least one flow characteristic of said erythrocytes comprises at least one of the mean curvature of the motion lines of said erythrocytes, the deviation from cylindrical symmetry of the motion lines of said erythrocytes, the spatial density of local turbulences in the motion lines of said erythrocytes, and the local deviations from the global character of the motion lines of said erythrocytes.

71. (New) A system according to claim 66 and also comprising a wavelength selecting device, such that said imager acquires said images of said at least one optically accessible blood vessel over a limited wavelength band.

72. (New) A system according to claim 71, wherein said wavelength selector is located in

the illuminating pathway between said light source and said at least one optically accessible blood vessel.

73. (New) A system according to claim 71, wherein said wavelength selector is located in the imaging pathway between said at least one optically accessible blood vessel and said imager.

74. (New) A system according to claim 71 and wherein said limited wavelength band is between 2 and 30 nanometers.

75. (New) A system according to claim 66 and wherein said light source for illuminating said at least one optically accessible blood vessel of the subject imager is a pulsed source having a pulse to pulse interval of less than 1 second.

76. (New) A system according to claim 75 and wherein said pulse to pulse interval is between 5 and 200 milliseconds.

77. (New) A system according to claim 75 and wherein said pulse to pulse interval is between 5 and 40 milliseconds.

78. (New) A system according to claim 66 and wherein said light source for illuminating said at least one optically accessible blood vessel of the subject imager is a continuous source, and said imager acquires images at predetermined intervals.

79. (New) A system according to claim 66 and wherein said at least one optically accessible blood vessel of the subject is a retinal blood vessel.

80. (New) A system according to claim 66 and wherein said at least one optically accessible blood vessel of the subject is located in tissue of an internal organ.

81. (New) A system according to claim 80, wherein said tissue is selected from the group consisting of esophageal tissue, gastro-intestinal tissue, brain tissue and the internal surface of a passageway.

82. (New) A system for vascular analysis of a subject, comprising:

(i) a light source for illuminating at least one optically accessible blood vessel of the subject, after ingestion by the subject of a biochemical label which labels arteriosclerotic plaque such that it has predetermined optical properties;

(ii) an optical imager for acquiring at least one image of said at least one optically accessible blood vessel of the subject;

(iii) an image processor utilizing said acquired at least one image of said at least one optically accessible blood vessel of the subject to determine the amount and location of regions of said predetermined optical properties of said labeled arteriosclerotic plaque; and

(iv) a mapper to generate a map of the arteriosclerotic deposits in the walls of said at least one optically accessible blood vessel of the subject.

83. (New) A system according to claim 38 and wherein said predetermined optical properties of said biochemical label are at least one of fluorescent, absorptive and reflective properties, and where said at least one image is accordingly at least one of a fluorescence, absorption and reflection image.

84. (New) A system according to claim 82 and wherein said map of the arteriosclerotic deposits in the walls of said at least one optically accessible blood vessel of the subject is utilized to ascertain the arteriosclerotic condition of another blood vessel of the subject.

85. (New) A system according to claim 82 and wherein said biochemical label is an antibody label.

86. (New) A system for vascular analysis of a subject, comprising:

a radiographic apparatus for imaging the subject after ingestion by the subject of a predetermined dose of a radioactive biochemical label for arteriosclerotic plaque; and

a plaque location deriver utilizing at least one image provided by said radiographic apparatus to determine the location of said radioactive biochemical label;

wherein said location of said radioactive biochemical label is utilized to determine the presence of arteriosclerotic plaque on the walls of at least one blood vessel of the subject.

87. (New) A system according to claim 86 and wherein said at least one blood vessel of the subject is not optically accessible.

88. (New) A system according to claim 86 and wherein said biochemical label is an antibody label.

Respectfully submitted,

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